

Archives of Biochemistry and Biophysics

VOLUME 221

1983



ACADEMIC PRESS

A Subsidiary of Harcourt Brace Jovanovich, Publishers

New York London

Paris San Diego San Francisco São Paulo Sydney Tokyo Toronto

Copyright © 1983 by Academic Press, Inc.
All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (21 Congress Street, Salem, Massachusetts 01970), for copying beyond that permitted by Sections 107 or 108 of the U. S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1983 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

MADE IN THE UNITED STATES OF AMERICA

CONTENTS OF VOLUME 221

NUMBER 1, FEBRUARY 15, 1983

INVITED PAPER

- The Human Interferons—From Protein Purification and Sequence to Cloning and Expression in Bacteria: Before, Between, and Beyond *Sidney Pestka* 1

COMMUNICATION

- Localization of the Disulfide Bond in Human Antithrombin III Required for Heparin-Accelerated Thrombin Inactivation *W. S. Ferguson and T. H. Finlay* 304

BIOCHEMICAL GENETICS AND CELLULAR DIFFERENTIATION AND DEVELOPMENT

- Acetylation of Histones during Spermatogenesis in the Rat
Sidney R. Grimes, Jr., and Nancy Henderson 108

BIOCHEMISTRY OF VIRUSES AND NUCLEIC ACIDS

- Isolation and Characterization of a DNA Sequence Complementary to Rat Liver Glutathione S-Transferase B mRNA *Cecil B. Pickett, Claudia A. Telakowski-Hopkins, Ann Marie Donohue, and Anthony Y. H. Lu* 89

BIOLOGICAL OXIDATION AND BIOENERGETICS

- Isolation and Characterization of Monoclonal Antibodies against Rat Liver Epoxide Hydrolase
Claudia A. Telakowski-Hopkins, Anthony Y. H. Lu, and Cecil B. Pickett 79
- Inhibition of Oxidative Phosphorylation by an Oligomer of Prostaglandin B₁, PGB_x *David K. Kreutter and Thomas M. Devlin* 216
- Correlation between Thylakoid Stacking and Cation-Induced Decrease in Photosystem I Electron Transport at Saturating Light Intensity
P. Ramanujam and Salil Bose 238
- Is Vitamin E the Only Lipid-Soluble, Chain-Breaking Antioxidant in Human Blood Plasma and Erythrocyte Membranes?
Graham W. Burton, Anne Joyce, and Keith U. Ingold 281

ENZYME MECHANISMS AND METABOLISM

- Lysosomal Carboxypeptidase B from Rabbit Lung Purification and Characterization *Mark Lones, Ranjit Chatterjee, Hari Singh, and George Kalnitsky* 64
- Microbial Oxidation of Methanol: Purification and Properties of Formaldehyde Dehydrogenase from a *Pichia* sp. NRRL-Y-11328
Ramesh N. Patel, Ching T. Hou, and P. Derelanko 135
- Kinetic Mechanism of Bovine Liver Argininosuccinate Lyase
Frank M. Raushel and Roderick Nygaard 143
- Multiple Modes of Catalysis-Dependent Inhibition and Inactivation of Aortic Lysyl Oxidase
Herbert M. Kagan, David M. Soucy, Cynthia G. Zoski, Ronald J. Resnick, and Shiow-Shih Tang 158

Purification and Some Properties of ATP-Citrate Lyase from Rat Brain	<i>Andrzej Szutowicz and Paul A. Srere</i>	168
The Interaction of Substrate-Related Ketals with Bacterial and Viral Neuraminidases	<i>Michael Flashner, Jack Kessler, and Stuart W. Tanenbaum</i>	188
Interaction of Bovine Glutamate Dehydrogenase with Isoquinoline Alkaloids	<i>Jan Kovář</i>	271

LIPIDS

Contribution of the Pentose Cycle to Lipogenesis in Bovine Adipose Tissue	<i>Stephen B. Smith</i>	46
Enzymatic Basis for the Formation of Pulmonary Surfactant Lipids by Acyltransferase Systems	<i>Harumi Okuyama, Kazuyo Yamada, Takaki Miyagawa, Masahiro Suzuki, Renuka Prasad, and William E. M. Lands</i>	99

MEMBRANE STRUCTURE AND FUNCTION

(Na ⁺ , K ⁺)-ATPase of Mammalian Brain: Effects of Temperature on Cation and ATP Interactions Regulating Phosphatase Activity	<i>Alan C. Swann</i>	148
The Glucose Transport System of Muscle Plasma Membranes: Characterization by Means of [³ H]Cytochalasin B Binding	<i>Amira Klip and Denise Walker</i>	175
Effects of Calcium on the Permeability of Isolated Adult Rat Heart Cells to Sodium	<i>Charlene M. Hohl, Ruth A. Altschuld, and Gerald P. Brierley</i>	197

PHOTOSYNTHESIS AND PLANT BIOCHEMISTRY

The Effects of Carbonic Anhydrase Inhibitors Formate, Bicarbonate, Acetazolamide, and Imidazole on Photosystem II in Maize Chloroplasts	<i>Alan Stemler and Paul Jursinic</i>	227
---	---------------------------------------	-----

PHYSICAL BIOCHEMISTRY AND PHYSICAL CHEMISTRY OF MACROMOLECULES

Theory of Electrophoresis of Reacting Systems as Applied to the Sulfhydryl Oxidation of Creatine Kinase	<i>John R. Cann, Nancy H. Fink, and Donald J. Winzor</i>	57
Interaction of α_2 -Macroglobulin with Trypsin, Chymotrypsin, Plasmin, and Painsin	<i>James B. Howell, Thomas Beck, Bruce Bates, and Margaret J. Hunter</i>	261

POLYSACCHARIDES AND COMPLEX CARBOHYDRATES

The Conformational Analysis of Oligosaccharides by ¹ H-NMR and HSEA Calculation	<i>Raymond U. Lemieux and Klaus Bock</i>	125
--	--	-----

PROTEIN STRUCTURE, FUNCTION, AND TURNOVER

Peptide Substrates for Chymosin (Rennin): Conformational Studies of κ -Casein and Some κ -Casein-Related Oligopeptides by Circular Dichroism and Secondary Structure Prediction	<i>J. Raap, K. E. T. Kerling, H. J. Vreeman, and S. Visser</i>	117
---	--	-----

REGULATION OF METABOLISM AND OF ENZYME ACTION

- In Vitro* Inhibitor Studies of Vitamin D 25-Hydroxylase in Rat Liver Microsomes
Bruce Kabakoff, Heinrich K. Schnoes, and Hector F. DeLuca 38
- The Effect of Dietary Fat on the Activity, Content, Rates of Synthesis, and Degradation and Translation of Messenger RNA Coding for Malic Enzyme in Mouse Liver
Robert S. Schwartz and S. Abraham 206
- Characterization of an ATP-Mg²⁺-Dependent Guanine Nucleotide-Stimulated Adenylate Cyclase from *Neurospora crassa*
Gary B. Rosenberg and Martin L. Pall 243
- Reconstitution of Adenylate Cyclase in *Neurospora* from Two Components of the Enzyme
Gary B. Rosenberg and Martin L. Pall 254
- Motility Activation, Respiratory Stimulation, and Alteration of Ca²⁺ Transport in Bovine Sperm Treated with Amine Local Anesthetics and Calcium Transport Antagonists
Jai Pal Singh, Donner F. Babcock, and Henry A. Lardy 291

ERRATUM

- Volume 218, Number 2, October 15, 1982: N. Kaneda, F. Tanaka, M. Kohno, K. Hayashi, and K. Yagi, "Change in the Intrinsic Fluorescence of Acetylcholine Receptor Purified from *Narke japonica* upon Binding with Cholinergic Ligands," pp. 376-383 308

NUMBER 2, MARCH 1983

INVITED PAPER

- Biochemistry of the Enkephalins and Enkephalin-Containing Peptides
Sidney Udenfriend and Daniel L. Kilpatrick 309

COMMUNICATIONS

- Synthesis of a Human Leukocyte Interferon with a Modified Carboxy Terminus in *Escherichia coli*
Nancy T. Chang, Hsiang-Fu Kung, and Sidney Pestka 585
- The Action Spectrum and Phototransformations of Pterobilin (Biliverdin IX γ)
Michèle Bois-Choussy and Michel Barbier 590
- Castanospermine, a Tetrahydroxylated Alkaloid that Inhibits β -Glucosidase and β -Glucocerebrosidase
Rick Saul, James P. Chambers, Russell J. Molyneux, and Alan D. Elbein 593
- Thymosin β_4 in Cultured Mammalian Cell Lines
Gregory J. Goodall, J. I. Morgan, and B. L. Horecker 598

BIOCHEMISTRY OF VIRUSES AND NUCLEIC ACIDS

- Carbon Source Transport, Nucleotide Levels, and Stable RNA Synthesis in a Mutant Strain of *Escherichia coli*
Steven H. Reynolds and Stephen G. Chaney 548

BIOLOGICAL OXIDATION AND BIOENERGETICS

- Isolation of a Fraction with Ca^{2+} Ionophore Properties from Rat Liver Mitochondria
Patricia M. Sokolove and James M. Brenza 404
- Interactions of Heme Proteins with Hydrogen Peroxide: Protein Crosslinking and Covalent Binding of Benzo[a]pyrene and 17β -Estradiol
Robert H. Rice, Young Moo Lee, and W. Duane Brown 417
- Induced Ca^{2+} Release in Skeletal Muscle Sarcoplasmic Reticulum by Sulfhydryl Reagents and Chlorpromazine
Alberto Bindoli and Sidney Fleischer 458
- Inhibition of an Oligomycin-Sensitive ATPase by Cationic Dyes, Some of Which Are Atypical Uncouplers of Intact Mitochondria
Marilyn S. Mai and William S. Allison 467
- Light-Induced ΔpH of Envelope Vesicles Containing Halorhodopsin Measured by Use of a Spin Probe
Naoki Kamo, Masumi Takeuchi, Norio Hazemoto, and Yonosuke Kobatake 514
- Nonionic Detergent Effects on Spectroscopic Characteristics and the Photocycle of Bacteriorhodopsin in Purple Membranes
Eric Lam and Lester Packer 557

COENZYMES

- Occurrence of Molybdenum in the Nicotinic Acid Hydroxylase from *Clostridium barkeri*
Gregory L. Dilworth 565

ENZYME MECHANISMS AND METABOLISM

- Kinetic Studies on the Chymotrypsin A_α -Catalyzed Hydrolysis of a Series of *N*-Acetyl-L-Phenylalanyl Peptides
Christopher R. Hill and Geoffrey Tomalin 324
- Electrostatic Facilitation of the Reaction Catalyzed by the Manganese-Containing and the Iron-Containing Superoxide Dismutases
Jeffrey Benovic, Tommy Tillman, Amelia Cudd, and Irwin Fridovich 329
- Phenylethanolamine-*N*-Methyltransferase: Alcohol and the Mechanism of Action
James D. Harralson and Fountaine C. Brown 354
- Differential Effects of Phospholipids on Skeletal Alkaline Phosphatase Activity in Extracts, *in Situ* and in Circulation
John R. Farley and Ursula M. Jorch 477
- Purification and Characterization of N^1 -Methylnicotinamide Oxidases I and II Separated from Rat Liver
Michiko Ohkubo, Shigeru Sakiyama, and Shinji Fujimura 534

HORMONE STRUCTURE AND FUNCTION

- Heterogeneity of the Glucocorticoid Receptors: Molecular Transformations during Activation, Detected by Electrofocusing
Sarah Ben-Or and Andreas Chrambach 343

IMMUNOLOGY

- Glutaraldehyde-Reacted Immunoprecipitates of L-Gulonolactone Oxidase Are Suitable for Administration to Guinea Pigs
Paul H. Sato and Delores M. Walton 543

Distribution of Thymosin β_4 in Vertebrate Classes	
<i>Susan Erickson-Viitanen, Silverio Ruggieri, Paolo Natalini, and B. L. Horecker</i>	570

LIPIDS

Pancreatic Porcine Phospholipase A ₂ Catalyzed Hydrolysis of Phosphatidylcholine in Lecithin-Bile Salt Mixed Micelles: Kinetic Studies in a Lecithin-Sodium Cholate System	
<i>William J. Hoffman, Marianne Vahey, and Joseph Hajdu</i>	361
Cardiac Carnitine Deficiency and Altered Carnitine Transport in Cardiomyopathic Hamsters	
<i>Carla M. York, Carol R. Cantrell, and Peggy R. Borum</i>	526

MEMBRANE STRUCTURE AND FUNCTION

Structural Requirements for Anion Substrates of the Methotrexate Transport System in L1210 Cells	<i>Gary B. Henderson and Edward M. Zevely</i>	438
The Lung Lamellar Body as a Functioning Membrane in Protein-Catalyzed Phosphatidylcholine Transfer	<i>Jane D. Funkhouser and Edwin R. Hughes</i>	499

OXYGENASES, MICROSOMES, AND P-450 REACTIONS

Studies on the Pathway of Methane Formation from Procarbazine, a 2-Methylbenzylhydrazine Derivative, by Rat Liver Microsomes	
<i>S. J. Moloney and R. A. Prough</i>	577

PHOTOSYNTHESIS AND PLANT BIOCHEMISTRY

Interaction of Ferredoxin and Ferredoxin-NADP Reductase with Thylakoids	
<i>Giorgio Forti, Alessandra Cappelletti, Rita Lucia Nobili, Flavio M. Garlaschi, Paolo D. Gerola, and Robert C. Jennings</i>	507

POLYSACCHARIDES AND COMPLEX CARBOHYDRATES

Proteoglycans from the Substratum Adhesion Sites of MSV-Transformed BALB/c 3T3 Cells	<i>Laura J. Miketo and Lloyd A. Culp</i>	447
--	--	-----

PROTEIN STRUCTURE, FUNCTION, AND TURNOVER

Studies of the Antigenic Properties of the Catalytic and Glycoprotein Subunits of Na ⁺ ,K ⁺ -ATPase	<i>William J. Ball, Jr., John H. Collins, Lois K. Lane, and Arnold Schwartz</i>	371
Multiple Forms of Myeloperoxidase from Human Neutrophilic Granulocytes: Evidence for Differences in Compartmentalization, Enzymatic Activity, and Subunit Structure	<i>Stephen O. Pember, Raymond Shapira, and Joseph M. Kinkade, Jr.</i>	391
The Nonenzymatic Glycosylation of Collagen	<i>Sarah Rogozinski, Olga O. Blumenfeld, and Sam Seifter</i>	428
Arginine-Specific Modification of Rabbit Muscle Phosphoglucose Isomerase: Differences in the Inactivation by Phenylglyoxal and Butanedione and in the Protection by Substrate Analogs	<i>Linda M. Pullan, Peter Igarashi, and Ernst A. Noltmann</i>	489

REGULATION OF METABOLISM AND OF ENZYME ACTION

Purification and Partial Characterization of Bovine Heart Phosphorylase Kinase <i>S. Derek Killilea and Nguyet M. Ky</i>	333
Guanine Nucleotide Activation and Inhibition of Adenylate Cyclase as Modified by Islet-activating Protein, Pertussis Toxin, in Mouse 3T3 Fibroblasts <i>Toshihiko Murayama, Toshiaki Katada, and Michio Ui</i>	381
AUTHOR INDEX FOR VOLUME 221	602

The Subject Index for Volume 221 will appear in the December 1983 issue as part of a cumulative index for the year 1983.

Instructions to Authors¹

Archives of Biochemistry and Biophysics is an international journal dedicated to the dissemination of fundamental knowledge in all areas of biochemistry and biophysics. Manuscripts are welcome that contain new and significant information of general interest to workers in these fields. Sufficient detail must be included to enable others to repeat the work.

Manuscripts should be written in clear, concise and grammatical English and should be submitted in triplicate (one original and two photocopies), including three sets of figures, to:

Archives of Biochemistry and Biophysics
Editorial Office
Seventh Floor
1250 Sixth Avenue
San Diego, California 92101

Failure to receive the required number of copies of the manuscript may delay review. *In the case of rejected manuscripts only one copy of the manuscript will be returned to the author.*

Original papers only will be considered. Manuscripts are accepted for review with the understanding that the same work has not been published, that it is not under consideration for publication elsewhere, and that its submission for publication has been approved by all of the authors and by the institution where the work was carried out. Abstracts of oral or poster presentations are not considered to constitute previous publication. Presentation of material in preliminary communications normally will not preclude publication of a full paper in *Archives*, provided that the full paper contains additional information that justifies its publication and does not repeat the presentation of the same data that supported the preliminary communication. The manuscript should be accompanied by copies of all preliminary communications and of all relevant manuscripts that are in press or under editorial consideration by another journal. Authors must verify the wording of any cited personal communication with the persons who supplied the information and obtain approval for the use of their names in connection with the quoted information or for the citation of unpublished work; written evidence of such approval should accompany the manuscript. All material published in *Archives* represents the opinions of the authors and should not be construed to reflect the opinions of the Editors or the Publisher.

Authors should suggest competent reviewers in their field and may also suggest individuals whom they wish to have excluded from the review process. Contributors will receive decision letters from the Executive Editor. Resubmitted manuscripts and correspondence concerning such manuscripts should be sent to the Executive Editor at the address indicated on the decision letter. Revised manuscripts should be accompanied by a copy of the unrevised version.

Many acceptable papers require minor revision or condensation. It is in the mutual interest of both the authors and the journal that amended manuscripts be returned promptly. A revised paper will retain its original date of receipt only if it is received by the Executive Editor within 2 months of the date of return to the author.

Authors submitting a manuscript do so on the understanding that if it is accepted for publication, copyright in the article, including the right to reproduce the article in all forms and media, shall be assigned exclusively to the Publisher. The Publisher will not refuse any reasonable request by the author for permission to reproduce any of his or her contributions to the journal.

Communications offer a means of early publication of work of such importance that rapid release is warranted. Normally they should not exceed 15 manuscript pages in length (including text, bibliography, tables, and figures). The review and printing of such papers will be expedited to provide earliest possible publication.

Form of Manuscript. Manuscripts should be typewritten and double-spaced throughout on one side of 8.5 × 11-in. white paper, with 1-in. margins on all sides. All pages should be numbered consecutively.

Subject Areas. Authors should specify on page 1 of the manuscript the Subject Area of the article submitted. See the back cover for the listing of the Subject Areas.

Page 1 should contain the article title, author(s), affiliation(s), a short running title (abbreviated form of title) of less than 65 characters including letters and spaces, the appropriate subject category for listing in the Table of Contents, suggestions for index list entries, and the name and complete mailing address (and telephone number if possible) of the person to whom correspondence should be sent.

Page 2 should contain a short abstract of 50–250 words.

Editorial style should conform to the *Handbook for Authors* (American Chemical Society).

Footnotes to the text should be identified by superscript Arabic numerals and should be typed double-spaced on a separate sheet; footnotes to tables should be identified by superscript lowercase italic letters (^a, ^b, etc.) and placed at the bottom of the table.

¹ An extended Instructions to Authors is published in the January issue of *Archives of Biochemistry and Biophysics*. Reprints are available from the Editorial Office upon request. Authors should consult the extended Instructions for details on nomenclature, IUPAC-IUB rules and recommendations, and accepted abbreviations.

Tables should be numbered with Roman numerals and cited consecutively in the text. Each table should be titled and typed double-spaced on a separate sheet. Units must be clearly indicated for each of the entries in the table.

Authors can submit complex tables and mathematical material as camera-ready copy. In this way, they are spared multiple, tedious proofreadings and the chance of error is reduced. Tables submitted as camera-ready copy should be typed single spaced whenever possible and preferably submitted as 5 × 7-in. glossy prints.

Figures should be cited consecutively in the text by Arabic numerals. Legends should be typed double-spaced on a separate sheet. All figures and illustrations are to be submitted in such form as to permit photographic reproduction without retouching or redrawing. Line drawings should be professionally drafted and no larger than 8.5 × 11 in. Letters and numbers should be at least $\frac{3}{16}$ in. (4 mm) in height (Leroy lettering size 200). Glossy prints of figures properly prepared are acceptable.

References should be cited in the text by an Arabic numeral in parentheses and listed at the end of the paper in numerical order typed double-spaced on a separate sheet. Abbreviations of journal titles should conform to those of *Chemical Abstracts Service Source Index*, 1969. Please note the following examples.

1. JONES, J. B., DILWORTH, G. L., AND STADTMAN, T. C. (1979) *Arch. Biochem. Biophys.* **195**, 255-260.
2. METZLER, D. E. (1977) *Biochemistry: The Chemical Reaction of Living Cells*, p. 298, Academic Press, New York.
3. HARRINGTON, W. F. (1979) in *The Proteins* (Neurath, H., and Hill, R. L., eds.), Vol. 4, pp. 246-409, Academic Press, New York.

Miniprint supplements are an effective way of presenting supportive data. They are printed from plates made by photographic reduction from typed pages provided by the author. Types of data that have been published as miniprint supplements include analyses relevant to studies of amino acid or polynucleotide sequences, details of chemical syntheses, preparation of enzymes, extended statistical or mathematical discussions, and X-ray diffraction data. The miniprint supplement is published in the journal, immediately following the parent paper, and is included in the reprints. Since the miniprint supplement is produced from camera-ready copy supplied by the authors with no redaction or editorial changes it is important that the copy be letter perfect and conform to the style of the journal. *Authors will not be permitted to make changes to the miniprint supplement at the proof stage. Any changes necessary in the proof must be made as a typeset "Note added in proof."*

Proofs will be sent to the author, with a reprint order form. Authors will be charged for extensive alterations.

Reprints. Fifty reprints of each article will be provided free of charge. Additional reprints may be purchased.